

Chapter II Operations
Subject 3 Emergency Operations
Topic 2 Streetcar Emergencies

A. PURPOSE

This procedure provides guidelines for managing emergency incidents involving the Metro Streetcar System, highlights specific life safety hazards inherent to the system, and also discusses considerations for shutting down power to the system when necessary. This procedure also provides streetcar system information necessary for safe operation and focuses on the most likely streetcar scenarios crews will encounter. These guidelines are not a universal remedy, and due to the limitless possible scenarios responding personnel could encounter, responding crews should always consider the risk management profile and exercise caution when operating near the streetcar system.

B. TERMINOLOGY AND SPECIFICATIONS

1. Streetcar Terminology

- a. SCV = Streetcar Vehicle
- b. OCS= Overhead contact system (overhead streetcar electrical wires)
- c. TPSS= Traction power sub-station
- d. Pantograph – Mechanical arm that electrically connects the streetcar vehicle to the overhead contact system wires
- e. MOF = Maintenance and Operations Facility
- f. ETS= Emergency Trip Switch (located at TPSS)
- g. OC= Operations control (nerve center for communications and operations of light rail)
- h. Sectionalization – Isolating parts of the streetcar system

2. Specifications

The streetcar system is an electrically powered public transportation system. A detailed map of the route, stops, and substations are provided in the appendix along with a list of important telephone numbers. The streetcar uses a single track system that runs in a loop through downtown and the Over-the-Rhine area.

The SCVs operate on DC electric current supplied from the traction power sub-stations (TPSS) by a single overhead contact system wire (OCS). Streetcar vehicles (SCVs) connect with the OCS via a pantograph that can be raised and lowered. The tracks operate as the negative return (not a significant electrical threat) for the current. The Operations Control (OC) functions as the nerve center for the streetcar system, and is able to communicate, coordinate, and remotely shut off power to the OCS. The OC is located at the maintenance and operations facility located at 1927 Race Street. The estimated train frequency is every 12-15 minutes during peak operations. however

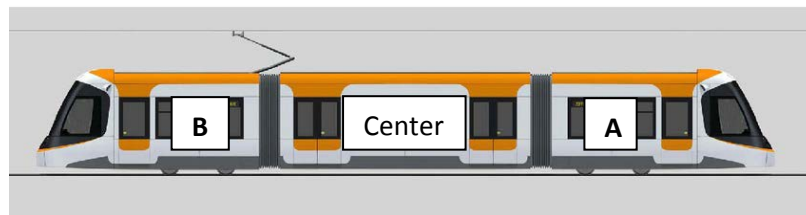
unusual streetcar movements (testing, charters, etc.) or traffic conditions can cause streetcars to operate more or less frequently .

The SCVs have an operator (driver) located in the forward cab (each end has a cab) of the SCV. The (operator/driver) must operate the train by utilizing a controller equipped with a "dead man" switch. In the event the operator becomes incapacitated, the SCV will come to a stop.

The streetcar will obey all traffic signals however there will be certain intersections where optical sensors will allow the streetcar to proceed through the intersection while all other traffic is at a four-way stop. These intersections are equipped with a special "lunar bar" type transit signal to assist the streetcar operator in moving through the intersection. Responding fire companies should proceed with extra caution at these intersections.

3. Streetcar Vehicle

- a. The vehicle is 77' 6" long, 12' 8" high 8' 8" wide with a Cab at each end and four doors on both sides
- b. The vehicle weighs 78,400 lbs empty with 154 person max capacity (38 seated/116 standing)
- c. The normal maximum operating speed is 25 mph, and up to 44 mph during high speed testing. The streetcar will be governed at 25 mph when fully operational.
- d. Approximately 529 foot stopping distance at 25 mph with passengers using normal braking or 218 feet using the maximum emergency braking.
- e. Very Quiet and equipped with both a gong (bell) and horn.
- f. There are three sections to a streetcar vehicle
 - i. The "A" Section – Cab and car WITHOUT pantograph
 - ii. The "B" Section – Cab and car WITH the pantograph attached
 - iii. The "Center" Section – Flexible car between the "A" and "B" cab.



4. Track Switch

- a. Tracks that move when manually thrown by a streetcar staff member changing the route of the streetcar.
- b. Manually operated and contain switch heaters (750v)

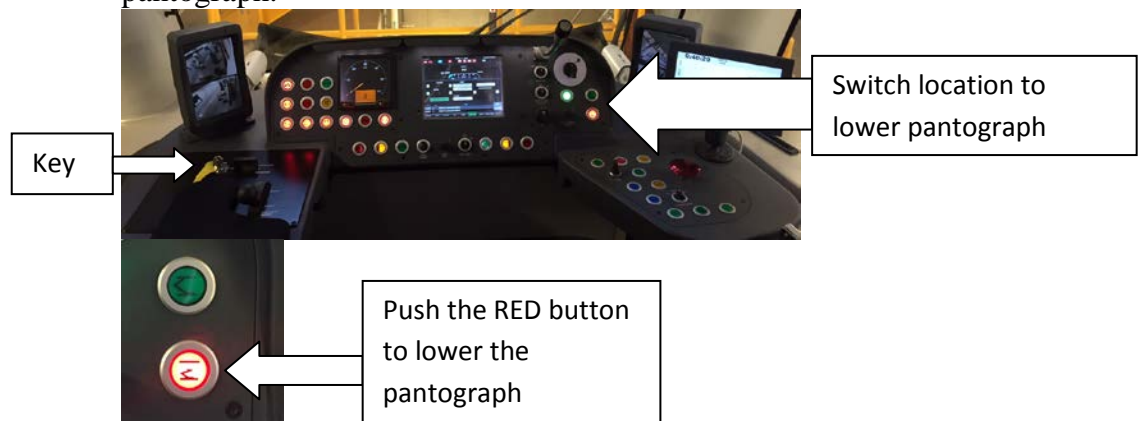
5. Traction Power Sub-Stations (TPSS)

- a. The transfer power stations will supply specific sections of the track – a color coded schematic will be provided in the appendix. It may be necessary to shut down two stations to de-energize the line in certain locations.
- b. The sub-stations will be protected by a fencing system. The key will be located in a Knox box near the gate.

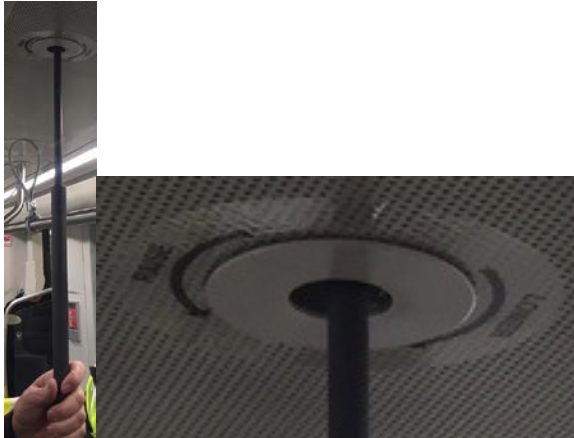
- c. Emergency Trip Switches (ETS) are located outside the door to the TPSS in a silver box on the exterior of the building. The box is opened using a Knox box key. Pushing the button may **or may not** kill the power to the section of the streetcar overhead contact system as the system is built with electrical redundancy. (Other TPSS may back feed the system. In addition, other streetcar vehicles moving along the system can generate electricity back into the system through their braking system.)
 - d. The traction power sub-stations are located as follows
 - i. TPSS #1 – Riverfront Transit Center
 - ii. TPSS #2 – 101 E. Court
 - iii. TPSS #3 – 1829 Race
 - iv. TPSS (Yard) – 117 Henry
 - v. TPSS (MOF) – located inside the south end of the MOF building
 - e. The TPSS contain electrical rectifiers, breakers, switchgear and transformers and Ni-cad batteries
 - f. Electricity AC 13,500 volts in, and 550-1000 volts DC out
6. Overhead Contact System
- a. The wire is solid grooved copper 350 kcmil (.592 inch diameter) non-insulated wire carrying 750v DC
 - b. 0-4000 AMPS (a taser is .00021 amps 50k volts) AMPS KILL
 - c. Wire is tensioned at 2000 lbs however the tension will fluctuate with the ambient temperature as the wire expands and contracts.
 - d. The normal height of the light rail overhead contact system wire is 19' 6"; BEWARE of lights, flags, or anything else sticking up when crossing the line. **NOTE** – The OCS may be as low as 14' 6" in locations where the OCS travels under overhead walkways

7. Pantograph

- a. The pantograph connects the SCV to the overhead contact system to power the streetcar. (Always size up the pantograph!) If the pantograph is in contact with the OCS the ENTIRE pantograph is energized. Do not place personnel on top of the car when the pantograph is in contact with the OCS.
- b. Lowering the pantograph to de-energize the vehicle can be accomplished in two methods
 - i. Automatic – a switch is located in the cab that will electronically lower and raise the pantograph. The switch is located on the right-hand side of the driver's console. Push the RED button to lower the pantograph.



- ii. Manual Lowering – The pantograph can be manually lowered from inside the “B” car.
1. The key in the cab of the SCV must be in the “off” position.
 2. A shaft is located in the ceiling behind a cover plate.
Remove the cover plate using a “square key.” The square key is located on a ring with the operator’s key in the cab.
 3. Retrieve the pantograph manual crank from the overhead compartment. The “square key” will unlock the compartment.
 4. Insert the crank onto the shaft in the ceiling and rotate in the direction noted to lower the pantograph.



- iii. Auxiliary switch – If the cab is significantly damaged, the pantograph can be lowered using the auxiliary switch in the opposite cab. The auxiliary switch is located on the right side wall (when seated in operators seat) just inside the door, under the electric panel in each cab. Turn and hold the auxiliary switch and it will lower the pantograph. (You will hear the power to the ventilation systems shut down)



8. Streetcar vehicle lighting

- a. The SCV has lights on the front and rear of the vehicle.
- b. Lighting configurations
 - i. Red/Amber – The vehicle is stopped and the keys are out.
 - ii. Red/Red – The vehicle is traveling away from you and you are looking at the rear of the vehicle
 - iii. Amber/Amber with Headlights – The vehicle is traveling toward you and you are looking at the front of the vehicle.



C. POLICY

1. Response

- a. Adhere to all emergency response procedures when crossing the streetcar system.
- b. Be cautious of left hand turns across the streetcar system.

2. Operating in streetcar system intersections

- a. Never park apparatus on or between the streetcar tracks
- b. When operating in streetcar intersections for incidents such as motor vehicle accidents company officers should consider the impact of streetcar traffic on scene safety. When streetcar traffic could compromise the safety of firefighters operating on or adjacent to the streetcar tracks, the company officers will contact Fire Dispatch and request they contact the Operations Center (OC) to temporarily stop streetcar traffic in the vicinity of the accident.
- c. The streetcar should be allowed to continue operating when it doesn't compromise scene safety. Activities within 5' of the centerline of the tracks could be impacted by streetcar traffic. Nonetheless, crews must remain watchful for SCVs and company officers should consider assigning a crew member to watch for SCVs. When in question, always error on the side of scene safety and stop SCV traffic as necessary.

3. Shutting down power to the OCS

- a. If there is an immediate life safety risk, request SORTA/Transdev Streetcar Supervisor through fire dispatch AND push the emergency trip switch (ETS) at the closest TPSS. REMINDER: Pushing the button may **or may not** kill the power to the section of the streetcar overhead contact system as the system is built with electrical redundancy. (Other TPSS may back feed the system. In addition, other streetcar vehicles moving along the system can generate electricity back into the system through their braking system.)
- b. Depending on the location and potential for back feed, a second ETS may need to be pushed on the TPSS at the opposite side of the incident to create a safety zone. (This still does not guarantee the electric is sectionalized or de-energized)
- c. Metro/Transdev personnel will respond and place grounding straps from the OCS to the rail on each side of the incident creating a safe work zone. This is the only procedure to ensure the electricity has been sectionalized and de-energized. This process may take 30-45 minutes from request.

D. PRIORITIES

Life Safety

Incident Stabilization

Property Conservation

E. OPERATIONS

1. Emergency medical response on the streetcar (passenger)

- a. SCV operator will coordinate the next stop location with the OC and Fire Dispatch. The SCV will always proceed to the next stop location for EMS response.
- b. Fire Dispatch will provide the address and stop name location during dispatch
- c. After entering the car, have operator show you the key is out. This engages the brake and disables the throttle ensuring the SCV won't move. The key is located on the left-hand side of the operator's console.



- d. As long as SCV is functioning normally and on the track there is no need to shut down power. This will allow the heat/air conditioning and lighting to continue functioning
 - e. Be aware of traffic safety at all times
 - f. Response: 1 Engine, 1 Medic,
 - g. Safety – Members shall wear all required PPE for response including reflective vests
 - h. Note: Patients in wheelchairs can only be evacuated through the middle doors of the SCV.
- ### 2. Emergency medical response on the streetcar (operator)
- a. SCV operator will coordinate the next stop location with the OC and Fire Dispatch if physically able. If the operator becomes physically incapacitated the “dead-man” switch will operate and stop the vehicle.
 - b. The SCV operator will be located behind a glass partition isolating the operator from the passengers. If it is necessary to force entry to access the operator. Consider breaking the glass to the side of the door and reaching in and unlocking the door.

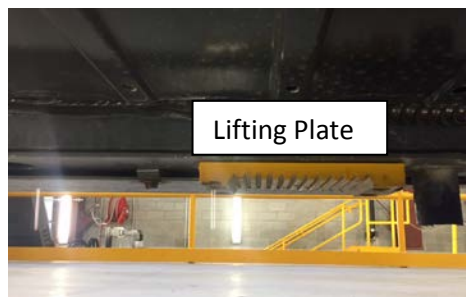
- c. Have operator remove the key or remove the key if the operator is incapacitated. This engages the brake and disables the throttle ensuring the SCV won't move. (See E-1-c above)
 - d. Response: 1 Engine, 1 Medic,
 - e. Safety – Members shall wear all required PPE for response including reflective vests
3. Vehicle accidents – SCV vs. another vehicle
- a. In most instances when SCVs collide with other vehicles they do NOT derail.
 - b. When SCVs derail, the operator can usually lower the pantograph and therefore eliminate the electrocution risk from the OCS.
 - c. Occasionally, when SCVs derail the pantograph becomes entangled in the overhead wire and cannot be lowered. In this scenario, the entire SCV becomes energized and poses a significant electrocution risk to both emergency responders and any passenger who makes ground contact (completes the circuit).
 - d. When responding to any accident involving a SCV the size up must include the following:
 - i. Is the pantograph raised and connected?
 - ii. Is the pantograph tangled in the OCS? If Yes **DO NOT LOWER THE PANTOGRAPH** - This could damage the OCS.
 - iii. Is the SCV on the tracks?
 - iv. Is the OCS intact? (no poles or wires down)
 - e. Electrical Hazard Actions: The SCV is derailed and the pantograph is still in contact with the OCS or if the OCS has been compromised and lines are down.
 - i. Do not approach the SCV or track
 - ii. De-energize the OCS by utilizing the procedure in Section C-Policy 3.
 - iii. Wait to approach the SCV and advise passengers to stay inside the SCV until power confirmed shut down by a Metro supervisor.
 - iv. The Metro supervisor will confirm that the appropriate breakers have been racked out and locked out in the TPSS. The supervisor should also attach a meter to the line to confirm power is off and attach a grounding strap. At this point power is assumed safe. See Section C Policy 3.

f. SCV access and extrication.

- i. Easiest access is through the SCV door – Manually open the doors by using the exterior emergency door releases located on each side of the vehicle. There are two releases on each side of the vehicle – one at each end. The releases are located behind a body panel.



- ii. Cutting through the body of the SCV does not provide adequate access to the patient compartment. Attack the doors if at all possible.
 - iii. The SCV has a bumper and bar three inches off of the track to reduce the possibility of people or cars becoming trapped underneath.
- g. Lifting the SCV
- i. SCVs are extremely heavy and unstable when lifted. Lift the SCV as a last resort. Metro has a specially designed vehicle to safely lift and re-rail the SCV however the response time is 30-60 minutes.
 - ii. Emergency lifting operations will only be conducted for the rescue of a viable patient. Metro re-railing equipment will be utilized for all other lifting
 - iii. Lifting procedures:
 1. Ensure key has been removed by the driver and the pantograph has been lowered.
 2. Lifting plates are mounted along the bottom frame of the SCV.
 3. If possible, lift the “A” section or the “B” section or both. Avoid lifting the “Center” section by itself.
 4. Utilize a bottle jack and wood cribbing to lift the car.



- h. Response: 1 Engine, 1 Ladder, 1 Heavy Rescue, 1 Medic, 1 District Chief and a Safety Officer (SO2 shall survey scene safety and be vigilant regarding electrical and traffic safety)

- i. Safety – Members shall wear all required PPE for response including reflective vests (If not wearing full firefighting PPE)
4. Vehicle Accident: Streetcar vs. Pedestrian
 - a. If the victim has been thrown out of the pathway and away from the rails of the streetcar – treat patient per protocol of car vs. pedestrian
 - b. If patient is within the pathway or near the rails of the streetcar, isolate the streetcar by having the driver remove the key and lower the pantograph.
 - c. If the victim is under the streetcar, refer to lifting procedures: Section Operations 3-g-iii
5. Fire in a Streetcar Vehicle
 - a. The SCV is not equipped with a fire protection system. Most of the working equipment is located on the top of the SCV. (Power, Heat/AC, batteries) The streetcar is specified to NFPA 130. The floor and ceiling have a 30 minute burn through rating.
 - b. Evacuate the SCV
 - c. De-energize the SCV (lower the pantograph) prior to attempting any fire suppression activities.
 - d. If necessary, disconnect the batteries using the battery isolation switch located behind an access panel in the “B” section of the SCV. The access panel is removed using a “square key”
 - e. Stop other SCV traffic as required
 - f. Use the apparatus to protect the scene from traffic for firefighters and passengers
 - g. Response: 1 Engine, 1 Ladder, 1 Heavy Rescue, 1 Medic, Safety Officer (SO2 shall survey scene safety and be vigilant regarding electrical and traffic safety)
 - h. Safety – Members shall wear all required PPE and SCBA for response including reflective vests (If not wearing full firefighting PPE)
6. Fire in a Traction Power Sub-Station (TPSS)
 - a. Treat this fire like a fire in an electrical sub-station or vault.
 - b. Do not enter or place water on the fire until it has been verified that the TPSS has been de-energized.
 - c. Be aware of the overhead contact system
 - d. Consider pushing the ETS if safe to access.
 - e. Response: 1 Engine, 1 Ladder, 1 Heavy Rescue, 1 Medic, 1 District Chief, Safety Officer (SO2 shall survey scene safety and be vigilant regarding electrical and traffic safety)
 - f. Safety – Members shall wear all required PPE and SCBA for response including reflective vests (If not wearing full firefighting PPE)
7. Structure Fire Operations along streetcar system
 - a. The overhead contact system presents an additional electrical hazard. Take additional precautions when spotting aerial apparatus. Just standing on top of the apparatus places the firefighter dangerously close to the contact lines (19.5’). **NOTE** – The OCS may be as low as 14’6” in locations where the OCS travels under overhead walkways.

- b. Maintain ten feet clearance in every direction from the OCS to include the apparatus, ladders and any other equipment.
- c. Do not operate hose streams close to the OCS as an electrocution risk exists if a straight stream contacts the OCS. If exterior hose lines must be operated – shut down the OCS. (See Section C-3 above)
- d. Companies along the streetcar route should pre-plan apparatus placement for the least impact on the streetcar system.
- e. If necessary to lay fire lines across the streetcar tracks, advise fire dispatch to shut down the streetcar system in your area of operation. Flag and stop streetcar vehicles that approach a hose or other apparatus placed on tracks. SCV will sever hose lines if it crosses over them.

8. Natural gas leak in vicinity of streetcar system
 - a. Streetcar produces significant sparks and could represent a source of ignition for natural gas leaks
 - b. Stop SCV traffic in the vicinity for any significant gas leak in close proximity. Have Fire dispatch contact Metro streetcar OC to suspend operations and lower pantographs of any vehicles in proximity.
 - c. Response: 1 Engine, 1 Ladder, 1 Heavy Rescue, 1 District Chief, Safety Officer (SO2 shall survey scene safety and be vigilant regarding electrical and traffic safety)
 - d. Safety – Members shall wear all required PPE for response including reflective vests (If not wearing full firefighting PPE)
9. Suspicious Package/Bomb Response on Streetcar Vehicle
 - a. The Cincinnati Police Department will investigate any bomb threat to the streetcar system
 - b. Once a suspicious package or device has been determined follow Operations Procedures 203.21 Hazardous Device Response.